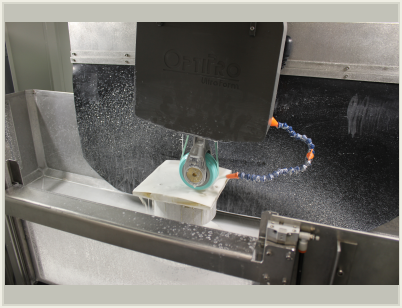
Optical Fabrication and Metrology of Aspheric and Freeform Mirrors, Phase II

Completed Technology Project (2013 - 2015)

Project Introduction

The requirement for cost effective manufacturing and metrology of large optical surfaces is instrumental for the success of future NASA programs such as LISA, WFIRST and IXO(now NGXO). OptiPro's UltraForm Finishing (UFF) is a sub-aperture compliant wheel and belt type polishing process for rapid material removal from the ground state to a finished optic. The UFF removes residual grinding sub-surface damage, mid spatial frequency errors, and provides the mechanism required for surface corrections. OptiPro's technologically advanced optical manufacturing capabilities along with a support partnership with the University of Rochester Mechanical Engineering Department and the Penn State EOC, gives us a very strong team and a clear path towards solving the difficult problems associated with, grinding, polishing and metrology of large complex optical surfaces. The UFF, with its 5-6 axis of motion provides a platform to polish traditional flats and spheres as well as aspheres and freeform shapes. The UFF was designed for deep concave shapes and it is suitable for finishing conformal optics. The Proposed Phase II will include further development on UFF using a 200 mm x 200 mm fused quartz mandrel to optimize the process to meet NASA's X-ray optical requirements. Grinding development will also be performed on OptiPro's eSX platforms to minimize material removal required during polishing. The part geometry will be measured by a non contact optical probe using OptiPro's UltraSurf free-form measurement system. Once development is complete, OptiPro will work on the mandrels that will be supplied by Goddard Space Flight Center to attempt to correct the form error on those surfaces. OptiPro will also build and install a 6-axis UFF machine to NASA. The UFF platform will be used for development during the Phase II effort, and installed at NASA at the end of the contract.



Optical Fabrication and Metrology of Aspheric and Freeform Mirrors Project Image

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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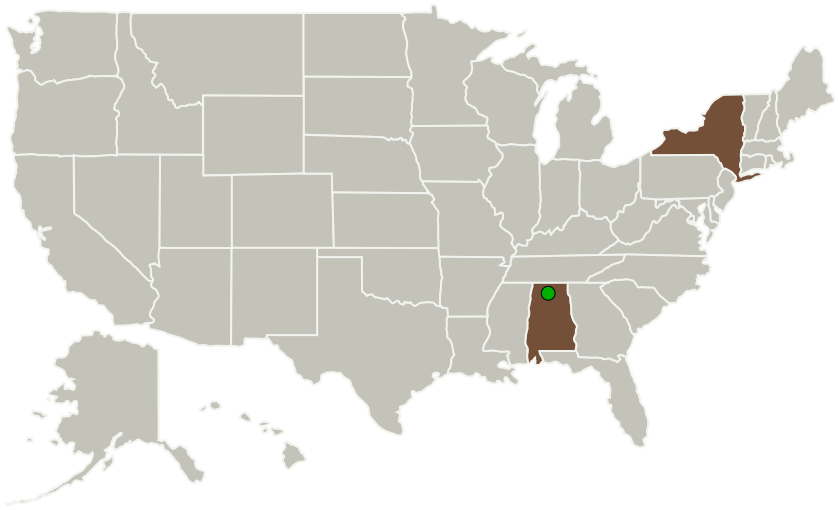
Completed Technology Project (2013 - 2015)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
OptiPro Systems LLC	Lead Organization	Industry	Ontario, New York
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	New York

Project Transitions

January 2013: Project Start

June 2015: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137309)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

OptiPro Systems LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Mohring

Co-Investigator:

David Mohring

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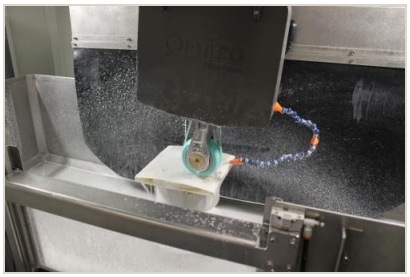
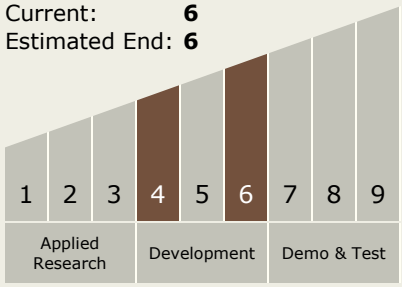
Images



Project Image
Optical Fabrication and Metrology of Aspheric and Freeform Mirrors Project Image
(https://techport.nasa.gov/image/134625)

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System